

**Knobbe Martens Olson & Bear LLP***Intellectual Property Law*

3403 Tenth Street  
Suite 700  
Riverside CA 92501  
Tel 909-781-9231  
Fax 909-781-4507  
kmob.com

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Curtis R. Huffmire  
Tina Chen

Of Counsel  
Louis J. Knobbe\*  
Jarry R. Seiler

Japanese Patent Atty  
Katsuhiko Arai  
Tomohisa Sugiyama

Korean Patent Atty  
Mincheol Kim  
Heungsoo Choi

Scientists & Engineers  
(Non-Lawyers)

Raimond J. Salenleke\*\*  
Khurram Rahman, Ph.D.  
Jennifer Haynes, Ph.D.\*\*  
Tommy Y. Nagata  
Che S. Cherekin, Ph.D.\*\*  
James W. Ausley\*\*  
Jennifer Hayes\*\*  
Kirk E. Pastorian, Ph.D.\*\*  
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Chris Westberg, Ph.D.  
Eric B. Ives, Ph.D.\*\*  
David C. Weber\*\*

\* A Professional Corporation  
† Also Barrister At Law (Eng & Wales)  
\*\* U.S. Patent Agent  
†† Also Solicitor (Eng & Wales)

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MESSAGE: Pursuant to your request, attached are proposed claims for discussion during the interview with Micheal Trenholm on July 10, 2003 at 2:00 p.m.

2040 Main Street  
14th Floor  
Irvine, CA 92614  
Tel 949-760-0404

550 West C Street  
Suite 1200  
San Diego CA 92101  
Tel 619-235-8550

201 California Street  
Suite 1150  
San Francisco CA 94111  
Tel 415-954-4114  
Fax 415-954-4111

1900 Avenue of the Stars  
Suite 1425  
Los Angeles CA 90067  
Tel 310-551-3450  
Fax 310-551-3458

1114 Marsh Street  
San Luis Obispo CA 93401  
Tel 805-547-5580  
Fax 805-547-5590

MICRON.172A

PATENT

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Deraa et al.
Appl. No.	: 09/945065
Filed	: August 30, 2001
For	: METAL SILICIDE ADHESION LAYER FOR CONTACT STRUCTURES
Examiner	: Junghwa M. Im
Group Art Unit	: 2811

PROPOSED AMENDED CLAIMS FOR INTERVIEW

1. (Twice Amended) An integrated circuit comprising:

a silicon substrate;

an insulating layer formed on the silicon substrate wherein the insulating layer has an opening that extends from an upper surface of the insulating layer to an upper surface of the substrate so as to expose the upper surface of the substrate;

a metal layer formed in the opening wherein a first portion of the metal layer is formed on the exposed upper surface of the substrate and reacts with silicon in the substrate to form metal silicide, wherein a second portion of the metal layer is formed on the sidewalls of the opening ~~does not contact the substrate~~ and remains unreacted; and

a metal silicide ~~adhesion~~-layer formed on an upper surface of the first and second portions of the metal layer, wherein the metal silicide layer comprises substantially the same composition as the metal silicide formed in the substrate, wherein the metal silicide ~~adhesion~~-layer adheres the second portion of the metal layer to a metal nitride layer that is subsequently formed ~~on the first and second portions of the metal layer~~ in the contact opening and fills substantially the entire opening, wherein a portion of the metal silicide layer directly contacts and combines with the metal silicide in the substrate to form a refractory metal silicide layer, wherein the refractory metal silicide layer extends approximately 50-150 Angstroms from the upper surface of the substrate and directly contacts the metal nitride layer.

Appl. No. : 09/945065  
Filed : August 30, 2001

14. (Twice Amended) A high aspect ratio contact structure formed over a junction region in a silicon substrate, comprising:

an insulating layer, wherein the insulating layer defines a contact opening having an aspect ratio of at least 10:1, wherein the contact opening is formed over the junction region of the substrate and exposes a portion of the substrate;

a titanium layer formed in and adjacent the contact opening, wherein a first portion of the titanium layer is formed on the insulating layer and a second portion of the titanium layer is formed on the exposed portion of the substrate, wherein at least a portion of the second portion of the titanium layer contacts the exposed substrate and reacts with the silicon in the substrate to form titanium silicide, wherein the first portion of the titanium layer does not contact the substrate;

a titanium silicide adhesion layer formed on an upper surface of the first and second portions of the titanium layer, wherein the titanium silicide adhesion layer combines with the titanium silicide in the substrate to form a refractory metal silicide layer having a thickness of approximately 50-150 Angstroms; and

a titanium nitride contact fill formed in and adjacent the opening, wherein the titanium nitride is formed on an upper surface of the titanium silicide adhesion layer, wherein the titanium nitride contact fill is adhered to the first portion of the titanium layer by the titanium adhesion layer.